

SECTION 795

LANDSCAPE MATERIAL

795.1 GENERAL:

Material used for landscaping purposes shall be in conformance with this specification section.

Submit certificates for approval for the following:

1. Ship materials with Certificate of Inspection required by governing authorities. Before delivery, Certificates of Compliance shall be submitted, certifying that materials meets the specified requirements. Certified copies of the reports for the following materials shall be submitted:
 - a. Transporting of Cacti and Protected Plants (from the Arizona Department of Agriculture).
 - b. Soil Amendments, Fertilizers, and Conditioners
2. For commercially-produced products, submit other data certifying that materials comply with specified requirements.
3. The Certification shall indicate; supplier's name, address, telephone number, date of purchase, name and technical description of the item purchased, and quantity of each item purchased.
4. Material samples shall be forwarded in a single package to the Engineer within two weeks after the Notice to Proceed. Soils test results, if required, shall accompany the samples of the materials.
5. The Engineer reserves the right at any time to take and analyze samples of materials for conformity to this section and the special provisions. Furnish samples upon request. Rejected materials shall be immediately removed from the project at no additional cost to the project. The cost for removing installed materials, that have been subsequently rejected shall be borne by the Contractor.

For identification and inspection, durable, legible labels, bearing the plant's name in water-resistant ink, shall be attached to all nursery stock or container of stock delivered to the project.

Protect landscape materials delivered to the work site from damage due to operations by other contractors, trades, and trespassers. Maintain protection during installation period.

Applicable publications listed below form a part of this section to the extent referenced:

1. American Association of Nurserymen, Inc. (AAN): American Standard for Nursery Stock (ASNS), 1986 Edition.
2. American Joint Committee on Horticultural Nomenclature (AJCHN): Standardized Plant Names (SPN), Second Edition, 1942.
3. Arizona Nursery Association Growers Committee (ANA): Recommended Tree Specifications, latest edition

Manure may not be used on the project.

795.2 TOPSOIL:

Imported topsoil shall be a fertile, friable soil, obtained from well-drained arable land which has or is producing healthy crops and shall be reasonably free of subsoil, roots, twigs, branches, brush, grasses, litter, construction debris, refuse, roots, heavy clay, clods, noxious and invasive weed seeds, phytotoxic materials, coarse sand, rocks greater than three inches or other deleterious or toxic to plant growth. At least 10 days prior to delivery of topsoil to the site, the Contractor shall furnish the Engineer at no additional cost to the project, with a written soil analysis prepared by a certified laboratory approved by the Engineer for each proposed source of topsoil. A minimum of five (5) analysis samples per each 500 cubic yards of imported material, per source, shall be tested and analyzed. The Engineer's written approval for each source shall be obtained prior to delivery of topsoil to the project area.

The top four to six (4-6) inches of on-site soil may be salvaged and utilized for topsoil, provided that it meets the requirements herein. In-situ soil not meeting this specification may be amended as described below.

The analysis results obtained for each characteristic from each material source shall meet the following requirements. For a topsoil source to be acceptable, a minimum of 3/5 of the tests and analyses shall meet or exceed the specifications below.

Table 795-1		
Characteristics	Test Method	Requirement Average of 5 Analyses
pH	Arizona 237	6.0 - 8.3

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Soluble Salts (PPM)	Arizona 237	2,000 Maximum
Calcium Carbonate	Arizona 732	8% Maximum
Exchangeable Sodium	Arizona 729	5% Maximum
Exchangeable Sodium (PPM)	Arizona 729	300 Maximum
Plasticity Index (PI)	AASHTO T 90	5-20
Gradation: 2 inch ½ inch No. 40	Arizona 201	% Passing: 100 85-100 85-100

If the test results for a proposed source fails to meet the specifications listed above, the material from that source shall be deemed unacceptable and rejected for use on the project. At such time, the contractor may propose for the Engineer's consideration a method of treatment or incorporation of materials or amendments to meet the specifications. Provided the Engineer approves the Contractor's proposal or requires additional remedial actions to be undertaken prior to acceptance of the proposal for use on the project, an approximately five cubic yard sample of the unacceptable topsoil shall be treated in accordance with the approved proposal. The modified material shall then be tested and reanalyzed by the Contractor at no additional cost to the project for compliance with the specifications. The five cubic yard sample preparation and testing may be conducted on-site or at the material source location. There will be no limit on the number of allowed topsoil modification attempts to meet the project requirements, except that modified topsoil not meeting the requirements will not be allowed in the finished construction. Topsoil, modified as required to meet the specifications, will be accepted for use on the project.

Prior to installation or placement, accepted topsoil shall be evaluated for its nutrient and fertility properties. As soon as possible after acceptable topsoil is excavated or generated via the modification process above, a one-gallon grab sample shall be collected for each 5,000 square feet of installed area (minimum of two samples) for use in agricultural fertility analyses by a certified laboratory as approved by the Engineer. The soil analysis shall include all properties necessary to make fertility recommendations for landscape, lawn, and garden applications. Perform and include a soil analysis documenting the parts per million (ppm) of Ca, Mg, Na, K, Fe, Zn, Mn, Cu, nitrate, nitrogen, and phosphorus at the test locations. The documentation shall also include levels of salinity, pH, sodium, and free lime. Also, the documentation must include recommendations from the laboratory for soil amendments to correct any nutrient deficiencies, eliminate conditions detrimental to plant growth, and improves soil fertility. Provide the analysis results and recommendations to the Engineer for review.

For each topsoil source location that has or is currently growing agricultural crops or where herbicides may have been used in the clearing of the vegetation, one bioassay test (0-1 foot depth) shall be required. Herbicides shall be treated with activated charcoal or similar materials as recommended by the certified laboratory to reduce or eliminate the deleterious effect of the remnant herbicides on plant growth and viability.

The Engineer reserves the right to accept minor deviations from these specifications if such acceptance is of benefit to the project.

Refer to Section 425 for installation and placement requirements related to topsoil used as a plating material and Section 430 if topsoil is used as a component of planting mixes.

795.3 SOIL FERTILIZING MATERIAL:

Fertilizing material shall comply with the applicable requirements of the State Agricultural Code. All fertilizing material shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guarantee analysis. It shall not contain toxic ingredients or fillers in quantities harmful to human life, animals or plants. It shall be delivered in unopened containers and shall have the chemical analysis as specified in the plans or specifications. Material, which has become caked or otherwise damaged, shall not be used.

795.3.1 Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

795.3.2 Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release

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nitrogen, 50 percent derived from natural organic **sources** of urea formaldehyde, phosphorous, and potassium in the following composition:

795.3.3 Slow-Release Nitrogen: Shall be Methylene urea (38-0-0) or equivalent slow-release nitrogen (SRN) used primarily to extend nitrogen availability where long-term availability is desired. Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen..

795.3.4. Planting Tablets: Shall be a commercial-grade, pre-measured 21-gram, ready to use, dissolving fertilizer tablet intended for long-term nutrient release. The primary constituents include 20% Total Nitrogen (N), 10% Available Phosphate (P₂O₅), and 5% Soluble Potash (K₂O), plus micronutrients.

795.4 ORGANIC SOIL CONDITIONERS:

In general, soil conditioners shall consist of a ground or processed wood product derived from redwood, ground or shredded fir, redwood or ponderosa bark. It shall have a nitrogen content of 1%, a pH not exceeding 7.5, and organic matter not less than 85%. Its gradation shall be such that at least 85% passes the 1/4 inch screen. In addition, it shall be treated with a non-toxic agent so as to be hygroscopic.

795.4.1 Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing the United States Composting Council's "Seal of Testing Assurance," and as follows:

1. Reaction: pH of 5.5 to 8.
2. Soluble-Salt Concentration: Less than 4 dS/m.
3. Moisture Content: 35 to 55 percent by weight.
4. Organic-Matter Content: 30 to 40 percent of dry weight.
5. Particle Size: Minimum of 98 percent passing through a 4-inch sieve.

795.4.2 Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2 inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

795.4.3 Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2 inch sieve, a pH of 6 to 7.5, a soluble-salt content measured by electrical conductivity of maximum 5 dS/m, having a water- absorbing capacity of 1,100 to 2,000 percent, and containing no sand.

795.4.4 Wood Derivatives: Shredded and composted, nitrogen-stabilized sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

795.4.5 Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 pound/cubic foot of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 pound/cubic foot of loose sawdust or ground bark.

795.5 CHEMICAL SOIL CONDITIONER:

Chemical soil conditioners such as soil sulfur, gypsum or iron additive shall be commercially approved brands designated for agricultural use. Material which has become caked or otherwise damaged shall not be used.

795.5 Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
2. Form: Provide lime in form of ground dolomitic limestone.

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795.5.2 Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

795.5.3 Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

795.5.4 Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial- grade FeDTPA for ornamental grasses and monocots.

795.5.5 Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

795.5.6 Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

795.6 SEEDS:

Seeds shall be fresh, clean seeds, pre-mixed to the specified proportion. They shall be delivered to the site in original, unopened containers. A Certification of Analysis for each species within a single or multi-species seed mix shall be furnished to the Engineer at least four (4) weeks prior to seed installation. The Certificates of Analysis shall contain the following information for each seed type: test results from the USDA 50 State Noxious-Weed list under the Federal Seed Act, a list of all seeds in the sample (including weed seeds), purity and germination, tetrazolium test results when used, and any pathology found to be present. The sample testing, when available, shall utilize with the rules for testing seed as published by the "Association of Official Seed Analysts" or the "Society of Commercial Seed Technologists."

795.6.1 Perennial Ryegrass: Seeds shall be collected from the seed heads of *Lolium perenne L.*, a cool season, turf-type perennial bunchgrass with a genetic diploid chromosome count of 14. Seed purity shall be a minimum of 98%. Perennial Ryegrass shall be used as a temporary ground disturbance stabilizer.

795.6.2 Common Bermuda Grass: Seeds shall be collected from the seed heads of *Cynodon dactylon*, a warm season, sod-forming, perennial, turf-type grass for installations requiring perennial coverage. Seed purity shall be a minimum of 98%.

795.6.3 Native Seeds: Sample tests for all seeds to be used on the project shall be submitted to the Engineer for approval prior to application. Seed shall contain no more than 0.025% common weed seed. For purposes of this specification, weed seeds shall be designated as all unnamed seeds, including crop seeds, not specified for seeding purposes. Seeds specifically identified and considered (but not limited to) as weed seeds include Bermuda grass (*Cynodon dactylon*), African lovegrasses (*Eragrostis* spp.), and bufflegass (*Pennisetum ciliare*).

795.7 SOD

Unless otherwise indicated, sod shall be locally-grown, Midiron Bermuda (*Cynodon dactylon* 'Midiron'). Sod shall be strongly rooted, not less than two years old, free of weeds and noxious or invasive native weeds. Machine cut to pad thickness of $\frac{3}{4}$ ", excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted. Sod shall be provided in pads of uniform size with a maximum 5% deviation in size when suspended vertically with a firm grasp on the upper 10% of the pad.

795.8 PLANTS, TREES, AND SHRUBS:

795.8.1 General: All plants shall be representative of their normal species or varieties. Unless otherwise specified, plants shall have a growth habit typical of the species. They shall have normal, well-developed branch systems and vigorous, fibrous root systems that are not root bound and are free of kinked or girdling roots. Plants with undeveloped, loose, or broken rootballs will not be accepted. Plants shall be free from pests, scale, disfigured knots, sun scald injuries, bark abrasions, rough/craggy bark, or other objectionable disfigurements. Weak plants will not be accepted. Plants shall show the appearance of normal health and vigor in strict accordance with this section and the special provisions.

Tree sizes shall generally conform to the Arizona Nursery Association's recommended average tree specifications subject to variations due to seasonal considerations or material availability.

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All stock shall have been grown in pots, cans, tubs, or boxes for a minimum of three months and a maximum of one year. They shall have sufficient roots to hold earth together after removal from the containers.

Stock shall be inspected and approved by the Engineer at the nursery or the Contractor's storage site prior to delivery to the project.

795.8.2 Cacti: Cacti shall be either nursery-grown or salvaged materials.

795.8.3 Trees: Trees shall be of the specified height, spread and caliper and shall stand erect without support. The height shall be measured from the root crown to the last division of the terminal leader with the branches in a normal position and the caliper shall be measured 12 inches above the crown roots. For palm trees only, the height shall be measured from the ground line to the base of the growing bud.

795.8.4 Shrubs: Shrubs shall be of the specified type, height and spread. They shall be selected from high quality, well-shaped nursery stock.

795.9 DECOMPOSED GRANITE

Decomposed granite shall be any phaneritic, granitoid igneous rock which has been weathered in place and which has as principal constituents granular fragments of quartz and feldspar. It may also contain fragments of granitic rock not yet broken down and possibly other minerals. This material shall remain stable when saturated with water. The color shall be as shown on the plans or as described in the special provisions.

All material used for the project or location shall be from a single source and shall present a uniform appearance. Particles larger than 2 inches, which will not be broken in the process of rolling and tamping during construction, shall not be used. Provide 5 gallons of material with certification of gradation for approval. The Engineer may waive minor deviations to the gradation requirements in this specification if requested, and the waiver is a benefit to the project.

795.9.1 Decomposed Granite for Stabilization Applications: Shall be ¼" minus and match the following gradation requirements:

Sieved Size	% Passing
1/4"	100
#4	90-100
#8	65-70
#10	60-65
#16	45-55
#30	35-40
#40	30-35
#50	25-30
#100	20-25
#200	10-15

795.9.2 Decomposed Granite for General Use: The gradation shall be as shown below.

Sieve Size % Passing
¾ inch 100%
½ inch 60-70
No. 40 5-20

795.9.3. Decomposed Granite for Accent Use: Granite shall have the same color and originate from the same pit/quarry run of designated granite types used on the project. If only one decomposed granite type/color is used on the project, the accent granite shall match that material. The size shall be 3-12 inches, per the plans. As directed, hand place the rock to achieve the desired appearance identified in the contract documents, to control gaps between the rocks, and to prevent erosion. A 5 foot by

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5 foot area of granite rock placement will be used as the referee sample. Once accepted, the rock placement will be the standard for the remainder of the project.

795.10 STABILIZER FOR DECOMPOSED GRANITE

Unless an equal is approved, the stabilizing agent shall be a nonflammable concentrated polyvinyl acrylic copolymer with a formulation containing a minimum of 60% solids which may be diluted for application at project site. It shall be applied at a rate of 1 gallon (concentrate) per 80 - 90 square feet.

After drying, the copolymer shall form a colorless, transparent micro-plastic like film to agglomerate particles and allow exchange of air and moisture. The product shall have a minimum effective service life of at least two years, provided surface is maintained according to manufacturer's recommendations. When cured, the copolymer emulsion shall not re-emulsify and shall be biodegradable and non-toxic to plant and animal life.

After application and drying, a core of the treated section shall be able to maintain a portion of its shape, elasticity, and a portion of its strength after being submerged in water for a 24 hour period. Contractor shall provide, signed copies of a compliance statement certifying that the copolymer complies with all governing specifications including weight per gallon, solids, pH, container size, and stating name or trade name of copolymer. The stabilizing agent shall meet the following specifications:

Color: White to off white, colorless when cured.

Form: Liquid

Weight: 9.1 pounds per gallon

pH: 4 to 5.05

Solids: 60%

Flammability: Non-flammable

Flash Point Open Cup: None

795.11 MISCELLANEOUS MATERIAL:

795.11.1 Tree Stakes: Unless otherwise specified, tree stakes shall be 2 x 2 inch redwood posts, free of knots and reasonably straight, and of sufficient length to properly support the tree.

795.11.2 Tie Wires: Tie wire shall be No. 12 AWG zinc coated wire and the cover for this wire shall be 1/2 inch garden hose.

795.11.3 Headers and Stakes: Wood, plastic, or steel edgings shall be as shown on the plans and as described in the special provisions. Concrete edging shall be Class B concrete.

795.11.4 Pre-Emergent: Shall be a broad-spectrum pre-emergent herbicide in accordance with the US Environmental Protection Agency's (EPA) Group 3 or 21 and in compliance with the manufacturer's recommendations.

795.11.5 Herbicides and Pesticides: Contact herbicides and pesticides used must comply with all applicable state and Federal laws and be registered with the U.S. Environmental Protection Agency. Contact herbicides shall be quick acting and permit planting within 7-10 days of their use. Herbicides, insecticides and fungicides shall be applied as needed and in accordance with the manufacturer's recommendations.

795.11.6 Hydromulch: Unless an equal is approved, the hydromulch shall be manufactured for use in the hydromulching process, green colored, fibrous, 100% wood cellulose mulch containing no growth or germination inhibiting factors. The mulch shall be virgin wood and be manufactured and processed so the fibers will remain in uniform suspension in water under agitation to form homogenous slurry. It shall contain a minimum identifying agent of 2% of volume by weight. Each package of the cellulose fiber shall be marked by the manufacturer to show the air-dry weight content. When hydraulically sprayed on the ground, the material will form a blotter-like cover impregnated uniformly with seed. The cover will allow the absorption of moisture and allow rainfall to percolate to the underlying area.

795.11.6 Tackifier: Shall be a naturally occurring organic compound and be non-toxic. It shall be a product typically used for binding soil and mulch in erosion control and seeding operations. It shall consist of mucilage by dry weight as active ingredient

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obtained from plantago or guar. The tackifier shall be labeled indicating the type and mucilage purity. The tacking agent shall be labeled indicating the type and mucilage purity.

The contractor shall have the tacking agent swell volume tested by an approved testing laboratory using the USP method. The standard swell volume shall be considered as 30 milliliters per gram. Material shall have a swell volume of at least 24 milliliters per gram. Certified laboratory test results for homogenous consistency shall be furnished to the Engineer for each shipment of tacking agent to be used on the project. Tacking agent rates shall be adjusted to compensate for swell volume variation. Material tested with lesser swell volume shall have the tackifier rate increased by the same percentage of decrease in swell volume from the standard 30 milliliters per gram. Material tested with greater volume may reduce tackifier rates by the same percentage of increase in swell volume from the standard 30 milliliters per gram. Tacking agent shall be pure material without starches, bentonite, or other compounds that would alter the swell volume test results of mucilage, or the effectiveness of the tacking.

795.11.7 Herbivore Protection: Herbivore protection shall only be required for selected plantings as designated by the Engineer. Protection shall be constructed of galvanized wire “hardware cloth”, 23-gauge (minimum) with ½” x ½” hole sizes, or approved equal. The cloth shall extend at least 2-1/2 feet above the finished grade and be buried underground at least 6 inches. Aviary and hex fence and “chicken wire” will not be accepted as a substitute for the hardware cloth. Submit a 2 foot x 2 foot section for approval before ordering/purchasing. The Engineer reserves the right to request that herbivore protection be installed around up to 100 percent of the installed plant materials on a plant-by-plant basis. When requested by the Engineer, install herbivore protection by the end of the shift during which the plants are planted. Herbivore protection will be paid for separately as directed by the Engineer.

- End of Section